

Patent Claims:

1. Master cylinder (1), in particular for a hydraulic brake system, with at least one pressure chamber (3) provided in a housing (2) of the master cylinder (1) and at least one housing bore (4) for accommodating the pressure fluid reservoir (5), a valve (6) with a closing element (7,24) being provided which due to a pressure difference prevailing between the pressure chamber (3) and the pressure fluid reservoir (5) can be moved into an opening position or a closing position, the valve (6) in its opening position allowing a pressure fluid flow (S1) from the pressure fluid reservoir (5) into the pressure chamber (3) and in its closing position throttling or preventing a pressure fluid flow (S2) in the opposite direction to the pressure fluid flow (S1) from the pressure chamber (3) into the pressure fluid reservoir (5), **characterized by that** means are provided which maintain the closing element (7,24) in the opening position when it is acted upon by a closing pressure difference due to an evacuation for the purpose of vacuum filling of the brake system, and allow the closing element (7,24) to move in the closing position when the brake is actuated.
2. Master cylinder (1) according to claim 1, **characterized by that** the valve (6) is provided with a first abutment element (8) arranged in the reservoir bore (4) for supporting the closing element (7) in the closing position, the closing element (7) being arranged in a moveable manner between the abutment element (8) and a bottom (9) of the reservoir bore (4) and the abutment element (8) being provided with a circumferential sealing bead (10) on the bottom side (50) facing the closing element (7) which is arranged in such a way that a

radially outer area of an upper side (11) of the closing element (7) in its opening position abuts on the sealing bead (10) in a sealing manner.

3. Master cylinder (1) according to claim 2, **characterized by that** the closing element (7) is formed as a disc and provided with webs (12) formed towards the bottom (9) of the reservoir bore (4), the webs (12) abutting on the bottom (9) in the opening position and guaranteeing the pressure fluid flow (S1) from the pressure fluid reservoir (5) into the pressure chamber (3).
4. Master cylinder (1) according to claim 2, **characterized by that** the closing element (7) is formed as a disc and provided with webs (31) on its circumference, which in the opening position allow an abutment of the disc (7) on a circumferential shoulder (32) of the reservoir bore (4) and guarantee the pressure fluid flow (S1) from the pressure fluid reservoir (5) into the pressure chamber (3).
5. Master cylinder (1) according to claim 1 or 2, **characterized by that** the valve (6) in its closing position opens when a certain pressure difference is reached allowing the unthrottled pressure fluid flow (S2) from the pressure chamber (3) into the pressure fluid reservoir (5).
6. Master cylinder (1) according to claim 5, **characterized by that** the abutment element (8) on its bottom side (50) is provided with projections (15) which serve as fulcrum (H) for the closing body (7) in the closing position when the pressure difference is reached which opens the valve (6), the closing element (7) deflecting and the radially outer area of the upper side (11) of the closing element

(7) detaching from the sealing bead (10) allowing the unthrottled pressure fluid flow (S2) from the pressure chamber (3) into the pressure fluid reservoir (5).

7. Master cylinder (1) according to claim 6, **characterized by that** the valve (6) is provided with a second abutment element (14) with channels (13) following the first abutment element (8) in the reservoir bore (4) towards the bottom (9), the second abutment element (14) serving for supporting the closing element (7) in its opening position.
8. Master cylinder (1) according to one of the claims 1 to 7, **characterized by that** an adhesive (K) maintains the closing element (7) in its opening position during the evacuation of the brake system, the adhesive (K) dissolving on contact with the pressure fluid during the vacuum filling.
9. Master cylinder (1) according to any one of the claims 1 to 7, **characterized by that** a clamping element (16) maintains the closing element (7) in its opening position during the evacuation of the brake system, where the clamping element detaches when the system is filled with pressure fluid under vacuum.
10. Master cylinder (1) according to any one of the claims 2 to 7, **characterized by that** a sleeve-type tensioning element (17) is provided in the first abutment element (8) projecting during the evacuation of the brake system from the first abutment element (8) towards the closing element (7) in such a manner that it maintains the closing element (7) in its opening position, a pressure difference caused by the first actuation of the brake and closing the valve (6) moving the closing element (7) into

its closing position, the closing element (7) pushing back the tensioning element (17) into the first abutment element (8) so that a movement of the closing element (7) into the closing position is possible when the brake is actuated.

11. Master cylinder (1) according to any one of the claims 1 to 7, **characterized by that** the closing element (7) is provided with circumferential locking elements (18) which during the evacuation of the system maintain the closing element (7) in the opening position by means of a mechanical locking which is detachable when the pressure fluid is filled in during the filling under vacuum.
12. Master cylinder (1) according to claim 7, **characterized by that** the material of the closing body (7) and the abutment elements (8,14) is chosen in such a way that a magnetic field (M) acting from the outside during the evacuation of the brake system maintains the closing element (7) in its opening position.
13. Master cylinder (1) according to any one of claims 1 to 8, **characterized by that** during the evacuation of the brake system a weight is fastened at the closing element (7) which maintains the closing element (7) in its opening position, the material of which is chosen in such a way that the weight is nearly neutralized in the pressure fluid when the brake is actuated.
14. Method for filling a brake system under vacuum, in particular by using a master cylinder according to claim 1, **characterized by that** a magnetic field (M) generated outside of the master cylinder (1), during the evacuation of the brake system maintains the closing element (7) of the valve (6) in its opening position thus allowing an

unhindered air flow (L) from the pressure chamber (3) into the pressure fluid reservoir (5) and thus allowing a venting of the brake system.

15. Master cylinder (1) according to claim 5, **characterized by that** the valve (6) is provided with a throttled pressure fluid connection (19,33) allowing a throttled pressure fluid flow (D) from the pressure chamber (3) into the pressure fluid reservoir (5) when the closing element (7,24) is in its closing position.
16. Master cylinder (1) according to claim 15, **characterized by that** the valve (6) is inserted in a connection area between the master cylinder (1) and the pressure fluid reservoir (5).
17. Master cylinder (1) according to claim 16, **characterized by that** the valve (6) is arranged in a connecting socket (28) of the pressure fluid reservoir (5).
18. Master cylinder (1) according to claim 15, **characterized by that** the master cylinder (1) is provided with a central valve and/or a supply bore and that the valve (6) is inserted in a connecting path between the central valve or the supply bore and the pressure fluid reservoir (5).
19. Master cylinder (1) according to claim 15, **characterized by that** the valve (6) is provided with a valve housing (20) in which a valve seat is mounted which can be displaced in longitudinal direction and that a second channel (46) can be connected by means of the valve seat (21).

20. Master cylinder (1) according to claim 19, **characterized by that** the valve seat (21) restricts at least in part the throttled pressure fluid connection (19).
21. Master cylinder (1) according to claim 15, **characterized by that** the valve (6) includes a valve body (27), a sealing element (24) with a sealing lip (22) and a leaf spring (25), the sealing lip (22) allowing the pressure fluid flow (S1) from the pressure fluid reservoir (5) into the pressure chamber (3) and the leaf spring (25) allowing the pressure fluid flow (S2) in the opposite direction when a certain pressure difference is reached.
22. Master cylinder (1) according to claim 15, **characterized by that** the valve (6) includes a valve body (27) and a sealing element (24) with two sealing lips (22,23), the first sealing lip (22) allowing the pressure fluid flow (S1) from the pressure fluid reservoir (5) into the pressure chamber (3) and the second sealing lip (23) allowing the pressure fluid flow (S2) in the opposite direction when a certain pressure difference is reached.
23. Master cylinder (1) according to claim 21 or 22, **characterized by that** the valve body (27) is provided with a permeable membrane (49) which allows the throttled pressure fluid flow (D) from the pressure chamber (3) into the pressure fluid reservoir (5).